Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Currently amended) A method for voicing a piano, ~~determining an optimal piano hammer felt voicing technique for voicing an unvoiced tone so as to achieve a predetermined standard of tonal quality associated with a given voiced tone using a computer program~~ wherein said method comprises:

a) creating a library comprising at least two records wherein each record comprises a transfer function and a voicing technique wherein said transfer function mathematically expresses the effect upon tonal quality of said voicing technique;

b) determining the harmonic profile for each of the unvoiced tone and the voiced tone;

c) identifying the record in said library that contains the transfer function that is most similar to a transfer function that would be calculated from the harmonic profiles determined in step b);~~and~~

d) outputting the voicing technique that is contained in said identified record; and

e) voicing at least one note on the piano according to the technique output in step d).

2. (Currently amended) The method according to claim 1 wherein step a) comprises

a) i) digitally recording at least one unvoiced tone and calculating and storing the harmonic profile of said tone in a computer program;

a) ii) manipulating the hammer felt by at least one voicing technique and recording a description of said voicing technique in said computer program;

a) iii) digitally ~~digitially~~ recording at least one voiced tone and calculating and storing the harmonic profile of said tone in said computer program;

a) iv) calculating the transfer function using said computer by analyzing the harmonic profiles determined in steps a) i) and a) iii) ; and

a) v) creating a library record comprising the transfer function from step a) iv) and the voicing technique from step a) ii);

wherein at least two records are created.

3. (Original) The method according to claim 1 wherein step a) said library comprises a plurality of records.

4. (Original) The method according to claim 1 wherein step c) comprises

c) i) calculating a voiced transfer function from the harmonic profiles of said unvoiced and voiced tones; and

c) ii) comparing the voiced transfer function to each transfer function in said library until the transfer function that is most similar to the voiced transfer function is found.

5. (Original) The method according to claim 1 wherein step c) comprises

c) i) applying each transfer function in said library to the harmonic profile of said unvoiced tone to generate a harmonic profile for each of said transfer functions; and

c) ii) comparing said harmonic profile of the voiced tone to each harmonic profile generated in step c) i) until the harmonic profile that is most similar to the harmonic profile of said voiced tone is found.

6. (Original) The method according to claim 1 wherein said harmonic profile comprises data for pitch, inharmonicity, time length and volume.

7. (Original) The method according to claim 1 wherein said harmonic profile comprises data for pitch, inharmonicity and volume.

8. (Original) The method according to claim 2 wherein recording a tone takes place at a sampling frequency that is at least twice the frequency of the highest audible harmonic in a tone.

9. (Original) The method according to claim 2 wherein in step a) ii) a voicing technique is selected from the group consisting of needling, chemically treating, filing, lacquering, steam ironing, or any combination thereof.

10. (Original) The method according to claim 2 wherein recording an unvoiced or voiced tone comprises recording an airborne acoustic signal.

11. (Original) The method according to claim 10 wherein recording an airborne acoustic signal is carried out using a flat response microphone.

12. (Original) The method according to claim 2 wherein an unvoiced or voiced tone is measured by a detector directly coupled to at least one part of the piano.

13. (Original) The method according to claim 12 wherein a part of the piano is selected from at least one of the bridge, soundboard, string, and hammer.

14. (Original) The method according to claim 2 wherein each harmonic profile is generated by a process comprising

a) calculating the frequency domain spectrum of the tone;

b) calculating the amplitude at each frequency in the frequency-domain spectrum;

c) identifying the fundamental frequency from among the frequencies in the frequency-domain spectrum;

d) identifying the frequency for each harmonic from among the frequencies in the frequency-domain spectrum;

e) determining the amplitude for the harmonic at each of said identified harmonic frequencies; and

f) determining the degree of inharmonicity for each harmonic.

15. (Original) The method according to claim 14 further comprising determining the ratio of the power of each harmonic to that of the fundamental frequency.

16. (Original) The method according to claim 14 wherein step a) said frequency-domain spectrum comprises at least one function selected from the group consisting of Fourier transforms.

17. (Original) The method according to claim 16 wherein the Fourier transform is selected from the group consisting of fast Fourier transforms (FFT), discrete Fourier transforms (DFT), discrete time Fourier transforms (DTFT) and Fourier series.

18. (Original) The method according to claim 14 wherein step a) comprises calculating the discrete Fourier transform (DFT) using a Fast Fourier transform algorithm.

19. (Original) The method according to claim 18 further comprising squaring the DFT coefficient at each frequency.

20. (Original) The method according to claim 19 the squared DFT coefficients comprise a vector of power coefficients.

21. (Original) The method according to claim 19 wherein step c) comprises finding a spike within said vector of power coefficients wherein said spike is found based on equipment parameters.

22. (Original) The method according to claim 21 wherein step c) further comprises identifying the midpoint at the width of said spike as said fundamental frequency.

23. (Original) The method according to claim 14 wherein step d) comprises searching for the frequency within a specified range of the necessary multiple of the fundamental, containing maximum power.

24. (Original) The method according to claim 14 wherein step e) further comprises storing the power for all harmonics in a vector.

25. (Currently amended) The method according to claim 14 wherein steps a) through f) are carried out using a ~~the~~ computer software program ~~MATLAB~~.

26. (Original) The method according to claim 2 wherein step ii) at least one voicing technique is selected from the group consisting of needling, chemically treating, filing, lacquering, and steam ironing.

27. (Original) The method according to claim 2 wherein step ii) comprises manipulating the hammer felt at at least one location selected from the shoulders, center or a combination thereof.

28. (Currently amended) A method for ~~determining an optimal voicing technique~~ for voicing a piano ~~unvoiced tone~~ to achieve a preferred standard of tonal quality as close as possible to a predetermined ~~some~~ voiced tone for a piano note using a computer program comprising a library comprising at least two records wherein each record comprises a transfer function and a voicing technique wherein said transfer function mathematically expresses the effect upon tonal quality of said voicing technique and wherein said method comprises:

a) determining the harmonic profile for each ~~of said unvoiced and voiced tones~~;

b) identifying the record in said library that contains the transfer function that is most similar to the transfer function that would be calculated from the harmonic profiles of said unvoiced and voiced tones; ~~and~~

c) disclosing the voicing technique that is contained in said identified record and

d) voicing a piano according to the technique disclosed in step c).